Goddard Procedural Requirements (GPR)

DIRECTIVE NO.	GPR 1700.2A	**APPROVED BY Signature:**	*Original Signed by*
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EXPIRATION DATE:	February 15, 2010	**TITLE:**	Director

COMPLIANCE IS MANDATORY

Responsible Office: 250/Safety and Environmental (S&E) Division

Title: Chemical Hygiene Plan

PREFACE

P.1 PURPOSE

This directive establishes the Goddard Space Flight Center (GSFC) Chemical Hygiene Program as required by NPD 1820.1, NASA Environmental Health Program.

The Program defines work practices and procedures to ensure that laboratory users and employees at GSFC are protected from health hazards associated with hazardous chemicals with which they work. It also defines organizational responsibilities and procedures required for the procurement, use, handling, storage, and disposal of hazardous chemicals on Center.

P.2 APPLICABILITY

This directive applies to personnel working in, visiting, or responsible for chemical laboratories in which chemical research and development are performed. In this application only, it applies to all GSFC employees, to all work conducted under the authority of GSFC, and to all equipment and property managed by GSFC. For GSFC contractors, it is applicable when directed through contract clauses in conformance with NASA Procurement Regulations. All other personnel will follow the provisions of this program while at GSFC facilities.

P.3 AUTHORITY

NPD 1820.1, NASA Environmental Health Program

P.4 REFERENCES

a. 29 CFR 1910.1000, Air Contaminants
b. 29 CFR 1910.1020, Access to Employee Exposure and Medical Records
c. 29 CFR 1910.1200, Hazard Communications
d. ANSI Z358.1-1990, American National Standards Institute, Emergency Eye Wash and Shower Equipment
e. 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories
f. GPR 1410.1, Directives Management
g. GPR 1410.2, Configuration Management
h. GPR 3410.2, Employee Competence and Quality Management System Training

i. GSFC Form 23-56, Low Hazard Review Checklist (Chemical Process Hazard Analysis)
j. GSFC Form 23-57, Moderate Hazard Review Checklist (Chemical Process Hazard Analysis)
k. GSFC Form 23-58, High Hazard Review Checklist (Chemical Process Hazard Analysis)
l. GSFC Form 23-64, Hazard Analysis Selection Matrix

P.5 CANCELLATION

GPG 1700.2, Chemical Hygiene Plan

P.6 SAFETY

Safety of operations associated with these processes shall be established by performing one or more Process Hazard Analyses. See Section 2.2.

P.7 TRAINING

Employees working in a chemistry laboratory shall be trained on the requirements of this program. Training requirements are explained in Section 5. Training records shall be maintained as described in P.8.

P.8 RECORDS

Record Title	Record Custodian	Retention
Chemical exposure monitoring, assessment, and employee notification records	Industrial Hygiene Office	Handle as permanent pending retention approval.
Records of training	Supervisors	*NRRS 3/33G1 - Destroy 5 years after employee discontinues or completes training.
Physician Report that evaluates the employee's exposure to a hazardous chemical	Health Unit	*NRRS 1/127A - Retain until employee is transferred or separated. Upon transfer, ship medical record to medical office of new assignment. Within 30 days after separation, transfer to National Personnel Records Center.
Records of safety equipment inspections and testing	Inspecting office	*NRRS 1/117A - Retire to Federal Records Center when related property is disposed of by NASA. Retire 5 years after disposal.
Process Hazard Analysis (GSFC Forms 23-56, 23-57, 23-58) and Hazard Analysis Selection Matrix (GSFC Form 23-64)	Owning organization	*NRRS 1/116 – Destroy when 3 years old, or upon discontinuance of the facility, whichever is sooner.
Records of chemical safety audits	Applicable safety office	Handle as permanent pending retention approval.

**NRRS – NASA Records Retention Schedule (NPR 1441.1)*

P.9 METRICS

The overall success of the Chemical Hygiene Program shall be determined by organization through assessment of the degree of compliance with this policy and legal and regulatory requirements, and performance in the following areas:

a. Comparison of self-evaluations and formal audits of chemical hygiene program areas resulting in number of discrepancies;
b. Number of trained laboratory workers;
c. Number of chemical inventories completed;
d. Effectiveness of hazard control measures by number of health incidents;
e. Number of Process Hazard Analyses (PHAs) completed for the laboratory and percentage of required PHAs completed; and
f. Trends and reduction in numbers of Office of Workers' Compensation claims for occupational illnesses among employees who work or worked in GSFC laboratories.

P.10 DEFINITIONS

a. Action level – an exposure level equivalent to ½ of the defined exposure limit, unless otherwise specified in Occupational Safety and Health Administration (OSHA) regulations.

b. Administrative controls – controls that limit or eliminate employee exposure by scheduling reduced work times in contaminant areas, and/or good work practices and employee training that include hazard recognition and work practices specific to the employee's job that can help reduce exposures.

c. Chemical Hygiene Officer – an employee designated to provide technical guidance in the development of the chemical hygiene program and regulatory enforcement authority for the implementation of the provisions of the Chemical Hygiene Program.

d. Chemical Hygiene Program – a written program that sets forth procedures, laboratory and control equipment, personal protective equipment, and work practices capable of protecting employees from the hazards presented by hazardous chemicals used in a particular laboratory workplace and meets requirements of 29 CFR 1910.1450(e).

e. Chemical Management System – a system for managing the procurement, use, and disposal of all hazardous chemicals that cross the boundaries of GSFC. The basis of this system is the on-line MSDSPro database used for maintaining Material Safety Data Sheets (MSDS) and chemical inventories.

f. Chemical process – for the purpose of this directive, a sequence of activities, involving defined procedural steps, materials, and equipment, by which change takes place in a chemical system.

g. Engineering controls – control methods that reduce or eliminate the hazard either by initial design specifications or by applying methods of substitution, isolation, or ventilation.

h. Hazardous chemical – a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes. Appendices A and B of the Hazard Communication Standard (29 CFR 1910.1200) provide further guidance in defining the scope of health hazards and determining whether or not a chemical is to be considered hazardous for GSFC purposes.

i. Hazard communication – a process whereby hazards of chemicals are identified, evaluated, and transmitted to employees. This transmittal of information is accomplished by means of comprehensive hazard communication programs, including container labeling and other forms of warning, material safety data sheets, and employee training.

j. Labels – markings on chemical containers that identify the material in the container and the risks and control associated with its use.

k. Laboratory – a facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

l. Laboratory-type hood – a device located in a laboratory, enclosed on five sides with a movable sash or fixed partial enclosure on the remaining side; constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory, and allows chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee's body other than hands and arms. Walk-in hoods with adjustable sashes meet the above definition provided that the sashes are adjusted during use so that the airflow and the exhaust of air contaminants are not compromised and employees do not work inside the enclosure during the release of airborne hazardous chemicals.

m. Laboratory scale – work with substances in which the containers used for reactions, transfers, and other handlings of substances are designed to be easily and safely manipulated by one person. Laboratory scale excludes those workplaces whose function is to produce commercial quantities of materials.

n. Laboratory use of hazardous chemicals – handling or use of such chemicals in which all of the following four conditions are met:

(1) Chemical manipulations are carried out on a laboratory scale, i.e., containers for reactions, transfers, and other handling can be easily and safely manipulated by one person;
(2) Multiple chemical procedures or chemicals are used;
(3) Procedures involved are not part of a production process, nor do they in any way simulate a production process; and
(4) Protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

o. Laboratory user – any individual assigned work in a laboratory.

p. Occupational Exposure Limit (OEL) – Any exposure limit established by OSHA, including time-weighted average, ceiling, short-term exposure limit, skin contact prohibition, or Threshold Limit Value published by the American Conference of Governmental Industrial Hygienists.

q. OSHA-regulated substances – those substances identified in 29 CFR 1910.1000.

r. Overexposure – exposure to levels of hazardous materials over or above the OEL.

s. Personal protective equipment (PPE) – protective garments and devices that employees wear to protect them from their environment. PPE should always be used in conjunction with engineering controls and other methods.

t. Process Hazard Analysis (PHA) – a safety analysis tool that determines the hazards and control measures for a chemical process. See section 2.2.

u. Toxicity – degree to which a substance is poisonous. Three levels are referred to in 29 CFR 1910.1450 App A, E.3 and E.4:

(1) Moderate Chronic Toxicity – medium toxicity marked by long duration or frequent recurrence;
(2) High Chronic Toxicity – high toxicity marked by long duration or frequent recurrence; and
(3) High Acute Toxicity – a critical or severe level of toxicity, which usually has an immediate effect on an exposed person.

PROCEDURES

In this document, a requirement is identified by "shall," a good practice by "should," permission by "may" or "can," expectation by "will," and descriptive material by "is."

1. Responsibilities

1.1 The Center Director shall ensure the workplace is safe and healthful for all GSFC workers.

1.2 Directors of shall ensure that laboratory-specific chemical hygiene procedures are developed, documented, and implemented.

1.3 Safety and Environmental (S&E) Division at Greenbelt shall:

a. Oversee development and implementation of the Chemical Hygiene Program and applicable procedures at Greenbelt;
b. Appoint a Chemical Hygiene Officer for Greenbelt;
c. Provide direction and oversight of GSFC chemical monitoring programs at Greenbelt and Wallops, ensuring that exposure assessments are conducted as needed and that exposure monitoring records are maintained;

d. Ensure the Health Unit on the Greenbelt campus completes the following responsibilities:
   (1) Conducts a medical assessment of laboratory users annually and when symptoms develop;
   (2) Provides medical evaluations and follow-ups to personnel suspected of exposure to hazardous substances above established action levels; and
   (3) Performs other health functions described herein;
e. Maintain chemical safety audit records;
f. Ensure that the General Chemical Hygiene Training Information and Guidelines for Chemical Storage are maintained current with OSHA and other regulatory and statutory requirements, and are available on the Safety 1st Web site http://safety1st.gsfc.nasa.gov/chem.html; and
g. Ensure the following Industrial Hygiene (IH) functions are performed:
   (1) Baseline and periodic (e.g., annually for high-hazard areas) exposure monitoring for all areas at GSFC/Greenbelt (at Wallops, this includes only the baseline assessment);
   (2) Employees' supervisors are informed of monitoring results in writing; and
   (3) Performance of ventilation systems, hoods, and other controls are evaluated annually or as requested.

1.4 Safety Office at Wallops shall:

a. Oversee development and implementation of the Chemical Hygiene Program and applicable procedures at Wallops;
b. Appoint a Chemical Hygiene Officer for Wallops;
c. Ensure the Wallops Health Unit provides medical evaluations to employees suspected of experiencing exposure above regulatory levels, and perform other functions described herein; and
d. Conduct periodic (e.g., annually for high-hazard areas) surveillance for all areas at Wallops;

1.5 Chemical Hygiene Officer has primary responsibility for the GSFC Chemical Hygiene Program. The Chemical Hygiene Officer (CHO) is appointed by the Center Director through the auspices of the Chief, S&E, for the Greenbelt campus, and by the Head, Wallops Safety Office, for the Wallops Flight Facility. The CHO shall:

a. Provide guidance in the implementation of the Chemical Hygiene Program;
b. Administer and enforce the requirements of the Program. Responsibilities include but are not limited to the following:

   (1) Oversee implementation of the Chemical Hygiene Program and applicable procedures;
   (2) Provide advice, oversight, and consultation to GSFC line management to ensure compliance with 29 CFR 1910.1450 and other relevant regulations and policies for procurement, use, storage, and disposal of chemicals used in laboratories;
   (3) As requested, review proposed laboratory use of chemicals and the proposed precautions used to protect employees, including specific designated areas and personal protective equipment;
   (4) As able, review laboratory use of chemicals and the precautions used to protect employees, including specifically designated controls and PPE;
   (5) Provide technical assistance to comply with the Chemical Hygiene Program;
   (6) Review annually and update, if necessary, the Chemical Hygiene requirements documentation;
   (7) Advise the Chemical Safety Committee on standards, regulations, and codes; and

(8) Be the primary reviewer of Moderate- and High-Hazard Reviews (PHAs).

1.6 Supervisors are responsible for operations within the organization, and for compliance with all relevant regulations, policies, and procedures. Supervisors shall:

a. Ensure that chemical hygiene procedures as defined herein are implemented to the extent necessary to maximize general laboratory safety;
b. Ensure employees working in a laboratory are informed/trained on the requirements of this Program;
c. Ensure that employees using PPE are trained in its use, and for respiratory PPE, have the required medical evaluations;
d. Maintain training records for Task-Specific Training as defined in GPR 3410.2;
e. Ensure that sufficient coordination is employed so that regulatory requirements relating to procurement, use, collection, transportation, storage, and disposal of laboratory chemicals are followed;
f. Ensure, in coordination with S&E, that exposure assessments are conducted if there is a reason to believe that exposure levels of a chemical substance could routinely exceed the action level (or OEL in the absence of an action level), and ensure that exposure monitoring records are maintained;
g. Ensure that their organization has one or more MSDSPro database administrators; and
h. Ensure a Laboratory Manager is appointed for every applicable laboratory.

1.7 Laboratory Managers hold primary responsibility for implementation of the Chemical Hygiene Program and for safe operation of their laboratories. Prudent and thorough planning for experiments and contingencies are paramount. Laboratory Managers shall:

a. Acquire the knowledge and information needed to control chemical hazards in the laboratory, including knowing the current OSHA requirements and MSDS recommendations for hazardous materials used in the laboratory;
b. Ensure that workers and visitors to the laboratory know and follow the applicable safety procedures;
c. Ensure that protective and emergency equipment is available and in working order, and that appropriate training for its use has been provided;
d. Identify, with the assistance of IH personnel, the appropriate PPE for each operation. Ensure that each worker has access to PPE that is in good condition, has the necessary training and medical certifications, and uses it correctly;
e. Know the current requirements concerning regulated substances;
f. Develop and maintain all current required documentation (see Section 2), and provide unrestricted access to this documentation for all laboratory users;
g. Ensure that MSDSPro is used to maintain a current inventory of all chemicals used in the laboratory, along with their MSDSs. Ensure that the inventory is updated at least annually.
h. Complete PHAs using GSFC Form 23-56, 23-57, or 23-58, as appropriate, and update the analyses when needed (see 2.2);
i. Ensure that laboratory users are aware of the hazards associated with the chemicals to which they may be exposed, and that they are provided appropriate task-specific training;

j. Ensure that the potential for employee exposure is considered prior to the use of a hazardous chemical(s);
k. Ensure that exposure monitoring is performed as necessary (see section 3);
l. Ensure performance of laboratory safety inspections as described in Section 6, and support S&E in performing the annual safety audit of the laboratory. Provide for corrective actions when needed;
m. Ensure that laboratory facility equipment (e.g., ventilators, eye washes, fume hoods, etc.) are properly maintained, and schedule repairs with Facilities Management Division (FMD) through FMD Work Requests, provide funds for the repairs, and provide expert assistance to FMD personnel to prevent exposure to chemical hazards; and
n. Comply with all applicable Federal, state, and local regulations, and facility procedures for chemical disposal.

1.8 Laboratory Users are responsible for personal safety while conducting assigned tasks with hazardous materials. Laboratory Users shall:

a. Follow safe, established work practices of the Chemical Hygiene Program and laboratory safety programs;
b. Report any concerns or observations of unsafe or unhealthy working conditions to the supervisor, or to S&E at Greenbelt or the Wallops Safety Office as appropriate;
c. Investigate potential hazards;
d. Develop good personal chemical hygiene habits;
e. Attend initial and refresher safety classes and supervisor's task-specific training;
f. Read, understand, and maintain familiarity with the Laboratory Safety Documentation Set (see section 2) for each laboratory in which they work;
g. Use PPE only when properly trained and, if applicable, when properly evaluated medically; and
h. Have the authority to effect changes in their work areas to mitigate the risks and thereby increase their safety.

2. Documentation Requirements

Laboratory managers shall develop specific safety procedures for each laboratory under their control. These procedures will be Controlled Documents as described in GPR 1410.2, and may be unique for each laboratory. Procedures may cover multiple laboratories controlled by the organization so long as each laboratory is clearly identified and the documents accurately describe the activities performed in the laboratory.

These procedures and other documentation described below will be included in a **Laboratory Safety Documentation Set** (LSDS). LSDS shall be displayed in a prominent location in the laboratory. The form of the Document Set for maintenance is at the discretion of the Laboratory Manager. The preferred form for display and for use in the laboratory is a notebook divided into sections for the information described below. The contents and whereabouts of this information should be clearly understood by laboratory users. It shall include all information described in sections 2.1 through 2.3. The laboratory notebook shall be updated or verified by the Laboratory Manager annually or when a laboratory process changes.

2.1 Chemical Hygiene Procedure. This is a laboratory-unique document that addresses the chemical hygiene requirements for each chemical laboratory. Every laboratory at GSFC is different, and presents its own unique situations that need to be addressed in safety procedures. A Chemical Hygiene Procedure shall be generated for any laboratory that uses hazardous chemicals for research purposes.

The Chemical Hygiene Procedure shall address the following eight elements:

a. Standard Operating Procedures (SOPs) for performing processes that involve hazardous chemicals. These are operating procedures for specialized operations that need to be performed in a specific sequence, or with specific conditions or other control factors, in order to maintain a safe and proper operation. A chemistry laboratory may have one standard procedure or many, based on the type of operation(s) performed. Generally, each specialized process should have its own SOP. As an alternative to being controlled documents, these may be in the form of Work Instructions as described in GPR 1410.1;
b. A brief list of control measures such as engineering controls, PPE, and hygiene practices, in particular, for extremely hazardous chemicals;
c. Use of fume hoods and other protective equipment, including maintenance and verification of a proper operation;
d. Provisions for additional employee protection for particularly hazardous substances;
e. Employee information and training requirements;
f. Identification of circumstances where an activity requires prior approval, with procedures for gaining approval;
g. Provisions for medical consultation and examinations (see section 4);
h. Designation of responsible personnel and points of contact (with contact information) for the Greenbelt or Wallops Chemical Hygiene Officer, the organization's representative on the Chemical Safety Committee, responsible managers, environmental services, other key points of contact, and emergency contacts.

The above items should be relatively simple, usually in the form of a listing with brief explanatory information where needed. The Chemical Hygiene Procedure shall be reviewed and its effectiveness revalidated at least annually by the Laboratory Manager. It should be updated as necessary. A template for developing the Chemical Hygiene Procedure is available on the Safety 1st Web site at http://safety1st.gsfc.nasa.gov/chem.html.

2.2 Process Hazard Analyses (PHA)

The owning organization shall identify and control hazards in the laboratory. The PHA is designed to aid management in meeting this responsibility.

2.2.1 Requirements

The PHA is mandatory for laboratories and other areas that use chemicals for other than normal housekeeping purposes. These analyses are used to assess the hazards associated with new or modified processes or operations in a laboratory environment.

The Laboratory Manager shall perform a PHA for each chemical process, and shall update it whenever new, modified, or relocated experiments or tests present a change in the potential hazard to employees, equipment, facilities, or the environment. The Laboratory Manager shall review and revalidate PHAs every 2 years. The form and format of PHAs are the responsibility of S&E and are defined on the Safety 1st Web site at http://safety1st.gsfc.nasa.gov/chem.html.

2.2.2 Levels of PHA

There are three levels of reviews for three anticipated levels of hazards: Low, Moderate, and High. The Hazard Analysis Selection Matrix (GSFC Form 23-64) is used to determine which level of analysis is appropriate. Then the PHAs are prepared using GSFC Form 23-56 (low hazard), 23-57 (moderate hazard), or 23-58 (high hazard), as appropriate.

The following are the required participants for the respective PHA:

Position	**LHR***	**MHR***	**HHR***
Laboratory Manager and users	X	X	X
Branch Head	X	X	X
Safety Representative			X
Additional Technical Sources			X

* See a, b, and c below

These guidelines are the minimum suggested methods, and are not meant to be a substitute for good judgment. Combinations of lower level hazards may indicate a need for a higher level of review. Conversely, if a lower level of hazard review than that indicated by these guidelines is judged acceptable, it may be used with the approval of the Laboratory Manager and Division Chief.

a. **Low Hazard Review (LHR):** Low Hazard Review (LHR) is conducted when the hazard is deemed "low." Low hazard is defined as having little potential to create injury or property damage, and no potential for environmental release. An LHR requires completion of a brief description of the process, the potential hazards, and what steps will be taken to mitigate those hazards. A set of operating procedures, the personal protective equipment required, special training required, and the signature of those involved with the review must be included. The Laboratory Manager and users conduct this level of review. The review is performed using GSFC Form 23-56.

b. **Moderate Hazard Review (MHR):** Moderate Hazard Review (MHR) is conducted when the hazards involved are deemed "moderate." Moderate hazard is defined as having the potential to cause injury, equipment damage, or environmental release. Laboratory Managers and users conduct an MHR. The involvement of a safety representative can be requested and is encouraged. An MHR requires the completion of a comprehensive checklist, and must be accompanied by a complete set of standard operating procedures. Among the information evaluated are process technology, potential hazards and mitigation, environmental issues, and adherence to specific engineering/design standards. The review is performed using GSFC Form 23-57.

c. **High Hazard Review (HHR):** High Hazard Review (HHR) is conducted for experiments, equipment installations, or processes that are deemed "high hazard." High Hazard is defined as having the potential to cause serious injury, severe equipment or facility damage, or negative environmental impact.

An HHR Committee shall be established for each Laboratory that meets the criteria for High Hazard Review. The HHR Committee will consist of a chairperson, a representative from S&E, a researcher, a technician, a member of the Chemical Safety Committee (CSC), and any other resources deemed necessary. A comprehensive review by the HHR Committee of all potential hazards involved in processes and equipment is required. A member of the CSC or the S&E representative can help determine what type of HHR method will be used based on the nature of the hazard(s) presented. The HHR requires that a number of documents be assembled and made available to the review committee. Piping and instrument diagrams, chemical reaction characteristics, relevant incident reports, process chemistry, and operation procedures are all required. The review is performed using GSFC Form 23-58 and must be documented completely. The HHR Committee must approve significant changes. The HHR Committee shall be commissioned by the Branch Head upon recommendations of the Laboratory Manager.

2.2.3 Records

The Lab Manager shall print and make part of the Laboratory Safety Documentation Set the completed Hazard Analysis Selection Matrix, PHA, and associated attachments. The record copy is kept by the laboratory's owning organization. The Lab Manager shall send a copy to S&E or the Wallops Safety Office, as appropriate.

2.3 Other Required Documentation. In addition to the above, the Laboratory Safety Documentation Set shall include the following:

a. General housekeeping and security requirements;
b. Inventory List of chemicals used;
c. MSDSs, available from the MSDSPro database and properly assigned to the laboratory location. Organizations should check MSDSPro for the chemicals they use, and if MSDSs are not present for all chemicals in use, they shall obtain the MSDS from the manufacturer. They shall then update MSDSPro with the information, print all MSDSs, and add them to the Laboratory Safety Documentation Set, make them available on line, or both;
d. Description of chemical storage locations and storage containment;
e. Exposure monitoring equipment and devices;
f. Emergency Plan, which includes procedures for spill control, ventilation failure, reporting, medical care, other emergencies, and drills. Describes location and operation of emergency equipment. Identifies primary and alternative evacuation routes and an outside assembly area. Lists emergency procedures and contacts, including location(s) of emergency equipment such as eye wash stations, wash-down showers, fire extinguishers, etc;
g. Chemical waste disposal procedures;

h. Schedules of laboratory inspections and periodic checks of control devices. Attach the schedule for inspection/evaluation of hood performance, as coordinated with the S&E industrial hygiene function, and eye washes and showers. Also include the organization's plan on monitoring/preventive maintenance of hood performance; and
i. Procedures to prevent restarting out-of-service equipment.

3. Exposure Determination

S&E IH function shall perform baseline and periodic exposure monitoring. If monitoring results show levels above recognized OELs, the operation will be monitored at established intervals until proven that applicable engineering and administrative controls and/or PPE are working to protect employees from the hazards exposed. If conditions change, the Laboratory Manager shall contact industrial hygiene personnel to assess the new conditions.

It may be appropriate to conduct an Exposure Evaluation when there is a report of a possible hazardous exposure. The IH function shall perform this evaluation. The basic steps of this evaluation are given below: (Assume that emergency medical treatment has already occurred.)

a. Interview the person initiating the complaint, and the exposed person, if not the same person;
b. List the following essential information about the circumstances of the complaint:
   (1) Chemical of suspicion;
   (2) Other chemicals in use by the exposed person;
   (3) Other chemicals being used by others in the immediate area;
   (4) Other chemicals stored in that area;
   (5) Signs and symptoms experienced;
   (6) Were control measures such as fume hoods and PPE used, and were these control measures functioning properly; and
   (7) Are any air sampling or monitoring devices in place or available to sample the area for suspect chemicals?
c. Determine how the signs and symptoms being experienced compare with information such as MSDSs and current medical practices;
d. Decide whether to send the employee for further medical evaluation; and
e. Review the control measures and safety procedures for adequacy.

The IH function shall keep a record of the exposure evaluation in accordance with section P.8 of this directive.

4. Medical Consultation and Examinations. The IHO shall investigate promptly all complaints of possible employee overexposure to toxic substances in the workplace. The Chemical Hygiene Program provides the opportunity for civil service employees who work with hazardous chemicals to receive medical attention, including follow-up examinations that the examining doctor feels are necessary.

There should be a medical consultation whenever there is reason to believe an employee has been overexposed to a hazardous chemical in the workplace. Examples of circumstances that indicate possible overexposure are:

a. The employee had direct skin or eye contact with a chemical substance;
b. Odor was noticed, especially if the employee was working with one or more chemicals with an OEL below the odor threshold;
c. The employee is experiencing adverse health symptoms that may be related to the exposure, e.g., headache, rash, nausea, coughing, tearing, irritation or redness of eyes, irritation of nose or throat, dizziness, loss of motor dexterity, or judgment which resembles drunkenness, etc. Some or all symptoms disappear when the employee is taken away from the chemical area into fresh air. Symptoms previously complained about reappear soon after the employee starts working with chemicals again;
d. Similar complaints are received from more than one person in the same work area;
e. Exposure monitoring reveals an exposure level routinely above the action level;
f. A spill, leak, or other release resulted in the likelihood of hazardous exposure; and
g. Damage or failure of PPE.

Resulting medical examinations and consultations shall be performed by or under the direction of the GSFC Medical Director, at no cost to the employee, without loss of pay, at a reasonable time and place. GSFC shall obtain a written report from the physician who evaluates the employee's exposure to a hazardous chemical in the workplace. The report will include:

a. The results of the medical examination and any associated tests;
b. Any recommendations for further medical follow-up;
c. Any known medical condition that may place the employee at increased risk as a result of a hazardous chemical in the workplace; and
d. A statement that the employee has been informed by the physician of the results of the examination and any medical condition that may require further examination or treatment.

The physician's statement should not include findings unrelated to occupational exposure. The report will be submitted to the Health Unit and become a permanent medical record.

5. Information and Training

Information and training are key parts of the Chemical Hygiene Program. Supervisors are responsible for ensuring that personnel receive the necessary training and retraining. Laboratory Managers are responsible for ensuring that untrained personnel do not work in the laboratory.

Information should be updated continuously and refresher training in all areas should be conducted regularly. The training and education program must be a regular, ongoing activity.

5.1 Information Requirements

Laboratory users must have the information to ensure that they know and understand the hazards of the chemicals in their work area. This information must be provided at the time of an employee's initial assignment to a work area where hazardous chemicals are present and before assignments involving new exposure situations, in accordance with OSHA standards.

Laboratory users must be familiar with the location, availability, and contents of:

a. This directive;
b. The Laboratory Safety Documentation Set (see section 2);
c. OSHA Standard 29 CFR 1910.1450, "Occupational Exposures to Hazardous Chemicals in Laboratories." This is available by going to www.OSHA.gov, selecting "Laws and Regulations," and then "OSHA Regulations (Standards – 29CFR);"
d. Standard reference material on the hazards, safe handling, storage, and disposal of the hazardous chemicals in the laboratory. This material includes, but is not limited to, MSDSs (GSFC's MSDSs can be obtained from MSDSPro at http://msds.gsfc.nasa.gov/); and
e. Symptoms associated with exposures to hazardous chemicals used in the laboratory.

5.2 Training Requirements

Training requirements include:

a. Methods and observations that may be used to detect the presence or release of a hazardous chemical, such as:
   (1) Monitoring conducted by the supervisor;
   (2) Continuous monitoring devices; and
   (3) Appearance or odor of hazardous chemicals when released.
b. Information on physical and health hazards of chemicals in the work area and methods of protection from those hazards;
c. Proper use of emergency equipment and procedures;
d. Receiving and stockroom personnel should know about the hazards of the materials moving into and through their work areas, proper use of handling equipment, protective apparel, and relevant regulations;
e. Contents of the Chemistry Laboratory General Safety Procedures and the Guidelines for Chemical Storage posted on the Safety 1st Web site http://safety1st.gsfc.nasa.gov/chem.html; and
f. Hazard communications, as applicable.

Each laboratory user whose job requires the use of PPE shall undergo training in the proper use of that equipment. Employees who are expected to wear any type of respirator (dust mask, cartridge respirator, Self-Contained Breathing Apparatus, etc.) shall have specific training in the use, maintenance, and disposal of respirators before using a respirator. They shall also have a current medical certification.

Employees using any OSHA-regulated substances (see Section P.10) shall undergo specific training in the use of those materials.

The organizational line manager of the individual laboratories shall certify to the IHO that the training elements listed above have been completed for each laboratory user.

6. Laboratory Inspection Requirements

OSHA requires several inspections to be performed at specified intervals. Minimum inspection requirements are described below:

Inspection Type	Interval / Details
Portable eye washes	Weekly by users, to verify operation and replace water.
Eye washes and showers	Annually by FMD (requires FMD Work Request). Operated by users weekly for verification of operation.
Fume hoods	Annually by IH. Users should verify proper operation before every use.
Inspections resulting from incidents involving abnormal exposure levels	As specified by IH or the Health Unit.
Inspections of emergency equipment	As specified in 29 CFR 1910.1450, or per the manufacturer's recommendations if not so specified.
Safety audits	Annually by S&E or Wallops Safety Office. Will include verification of compliance with this GPR.
Self-inspections, as defined by the Laboratory Manager	As defined by the Laboratory Manager.

Records of inspections, including date, location, participants, and findings, will be kept for all inspections, and retained as specified in Section P.8.

7. Waste Disposal

Owning organizations shall manage all waste in accordance with applicable GSFC requirements for waste management, and applicable regulations. S&E is responsible for removal and disposal of hazardous wastes. To dispose of hazardous wastes, laboratory personnel shall call the Hazardous Waste Pickup line on extension 6-9233 at Greenbelt, and extension 1718 at Wallops.

Owning organizations shall consider all chemicals, hazardous materials, or materials that are in any way dangerous, hazardous waste until evaluated by S&E. Also, if a process creates new disposal considerations, owning organizations shall consult S&E.

Owning organizations shall keep waste materials in closed containers that are compatible with the waste. Owning organizations shall store hazardous wastes in the same manner as the hazard for which the original material was stored, and shall maintain the identity of the material to be disposed of to prevent delaying the disposal process and increasing the cost. Owning organizations shall properly label

containers with the name of the contents, the date the material was placed in the container, and the words "Hazardous Waste."

Owning organizations shall not pour waste chemicals down a drain or add them to mixed refuse or landfill burial. This is unacceptable and is against the law. Moreover, owning organizations shall not use fume hoods as a means of disposal for volatile chemicals.

CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
Baseline	05/19/2004	Initial Release.
A	02/15/05	Document revised to clarify all requirements in accordance with NASA Rules Review Committee recommendations.